

# 5.2 Partial Fractions Key

Name \_\_\_\_\_ Date \_\_\_\_\_ Period \_\_\_\_\_

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Write the terms for the partial fraction decomposition of the rational function. Do not solve for the constants.

3)  $\frac{x^2 - 7}{x(x+2)(x-2)} = \frac{A}{x} + \frac{B}{x+2} + \frac{C}{x-2}$  1) \_\_\_\_\_

6)  $\frac{x^5 - 2x^4 + x - 1}{x^3(x-1)^2(x^2+9)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x^3} + \frac{D}{x-1} + \frac{E}{(x-1)^2} + \frac{Fx+G}{x^2+9}$  2) \_\_\_\_\_

4 Find the partial fraction decomposition.

let  $x=2$   
 $\frac{x+22}{(x+4)(x-2)} = \frac{A}{x+4} + \frac{B}{x-2}$   
 $x+22 = A(x-2) + B(x+4)$   
 $24 = B(6)$   
 $4 = B$

let  $x=-4$   
 $-4+22 = A(-4-2)$   
 $18 = -6A$   
 $-3 = A$

$\frac{-3}{x+4} + \frac{4}{x-2}$

4  
 let  $x=-3$   
 $\frac{x-3}{x(x+3)} = \frac{A}{x} + \frac{B}{x+3}$   
 $x-3 = A(x+3) + Bx$   
 $-6 = B(-3)$   
 $2 = B$

let  $x=0$   
 $-3 = 3A$   
 $-1 = A$

4)  $\frac{-1}{x} + \frac{2}{x+3}$

6)  $\frac{4x+4}{x^2(x+2)} = \frac{A}{x} + \frac{B}{x^2} + \frac{C}{x+2}$

$4x+4 = Ax(x+2) + B(x+2) + Cx^2$

let  $x=0$   
 $4 = 2B$   
 $2 = B$

let  $x=-2$   
 $4(-2)+4 = C(-2)^2$   
 $-4 = 4C$   
 $-1 = C$

let  $x=1$   
 $4(1)+4 = A(1)(1+2) + 2(1+2) + C(1)^2$   
 $8 = 3A + 6 - 1$   
 $8 = 3A + 5$   
 $3 = 3A$   
 $1 = A$

5)  $\frac{1}{x} + \frac{2}{x^2} + \frac{-1}{x+2}$

$$6) \frac{x^2 - 2x + 1}{(x-2)^3} = \frac{A}{x-2} + \frac{B}{(x-2)^2} + \frac{C}{(x-2)^3}$$

$$x^2 - 2x + 1 = A(x-2)^2 + B(x-2) + C$$

let  $x=2$

$$(2)^2 - 2(2) + 1 = C$$

$$4 - 4 + 1 = C$$

$$1 = C$$

$$7) \frac{2}{(x-5)(x-3)}$$

$$\frac{A}{x-5} + \frac{B}{x-3}$$

let  $x=0$

$$1 = A(0-2)^2 + B(0-2) + 1$$

$$1 = 4A - 2B + 1$$

$$0 = 4A - 2B$$

let  $x=3$

$$2 = A(x-3) + B(x-5)$$

$$2 = -2B$$

$$B = -1$$

let  $x=5$

$$2 = 2A$$

$$1 = A$$

$$8) \frac{4}{x^2 - 1} = \frac{A}{x-1} + \frac{B}{x+1}$$

$$4 = A(x+1) + B(x-1)$$

let  $x=1$

$$4 = 2A$$

$$2 = A$$

let  $x=-1$

$$4 = -2B$$

$$-2 = B$$

$$9) \frac{1}{x(x+2)} = \frac{A}{x} + \frac{B}{x+2}$$

$$1 = A(x+2) + Bx$$

let  $x=-2$

$$1 = -2B$$

$$-\frac{1}{2} = B$$

let  $x=0$

$$1 = 2A$$

$$\frac{1}{2} = A$$

$$10) \frac{-x+10}{x^2+x-12}$$

$$(x+4)(x-3) \frac{A}{x+4} + \frac{B}{x-3}$$

let  $x=3$

$$-x+10 = A(x-3) + B(x+4)$$

$$-3+10 = B(3+4)$$

$$7 = 7B, B=1$$

let  $x=-4$

$$-(-4)+10 = A(-4-3)$$

$$14 = -7A$$

$$-2 = A$$

$$11) \frac{x+17}{2x^2+5x-3}$$

$$(2x-1)(x+3) \frac{A}{2x-1} + \frac{B}{x+3}$$

$$x+17 = A(x+3) + B(2x-1)$$

let  $x=-3$

$$-3+17 = B(2(-3)-1)$$

$$14 = -7B$$

$$-2 = B$$

let  $x=\frac{1}{2}$

$$\frac{1}{2}+17 = A(\frac{1}{2}+3)$$

$$\frac{35}{2} = \frac{7}{2}A$$

$$5 = A$$

$$\frac{1}{x-2} + \frac{2}{(x-2)^2} + \frac{1}{(x-2)^3}$$

let  $x=1$

$$(1)^2 - 2(1) + 1 = A(1-2)^2 + B(1-2) + 1$$

$$1 - 2 + 1 = A - B + 1$$

$$0 = A - B + 1$$

$$B = A + 1$$

$$0 = 4A - 2(A+1)$$

$$0 = 4A - 2A - 2$$

$$A = 1$$

$$B = 2$$

$$\frac{1}{x-5} + \frac{-1}{x-3}$$

$$\frac{2}{x-1} + \frac{-2}{x+1}$$

$$\frac{1/2}{x} + \frac{-1/2}{x+2}$$

$$\frac{-2}{x+4} + \frac{1}{x-3}$$

$$\frac{5}{2x-1} + \frac{-2}{x+3}$$